



CONSUMER GUIDE

GASOLINE OCTANE FACTS and MYTHS

When you pull into a gas station to fill up your car's tank, you almost always have a choice of several kinds of gasoline. The majority of pumps usually offer a product called "regular," other pumps are labeled "premium," "super," or something similar, and their product sells at a price about 12 to 13 percent higher than the price of "regular." The difference in name and price is based on the gasoline's "octane." Regular gasoline has an octane rating of at least 87. The octane of mid-grade gasoline will range from 88 to 90. Gasoline labeled and sold as "premium" is required by law to have an octane rating of 91 or higher.

What is octane?

Octane actually has two definitions.

One is chemical: Octane is a flammable hydrocarbon liquid that along with other hydrocarbons – pentane, hexane, heptane, and many others – is refined from crude oil and make up the blend of chemical components called gasoline.

A second definition: Octane is a measure of a fuel's tendency to knock or ping when it is mixed with air and burned in the cylinder of an engine. This octane rating is not based on the amount of chemical octane in the gasoline. The rating is called octane because the gasoline's ability to prevent engine knock has been rated against the performance of pure hydrocarbon octane, which has a rating of 100. Gasoline, which is made from a blend of many other hydrocarbons, may have a higher or lower rating, depending on how its anti-knock performance compares to the performance of pure hydrocarbon octane.

How is octane rating determined?

Gasoline is subjected to two testing methods to establish its octane rating: one, called the motor method, runs the gasoline in an engine running under load; and the second, the research method, runs the gasoline in a free-running engine. The research method gives slightly higher ratings, and the octane number displayed on the pump is an average of the two methods.

Octane Facts

- Knock occurs when cylinder pressures are high. It is normal for an engine to ping a little at full throttle because cylinder pressures are very high at full throttle. Engine knock, however, should not be ignored since it can result in serious damage to the engine.
- High octane gasoline burns slower than low octane gasoline. The slow burn prevents engine knock when cylinder pressures are high.
- If your engine runs well and does not knock or ping on low octane gasoline, there is no advantage in switching to higher octane gasoline.
- If your engine knocks or pings, it does not necessarily mean something is wrong with the gasoline. It could be a problem with the engine's electronic control systems, ignition timing or exhaust gas recirculation. On a high mileage engine, a carbon build-up in the cylinders can increase cylinder pressures and cause knock.

- Almost all of today's new cars have fuel-injected engines that need to use gasoline with a detergent additive. They do not necessarily need high octane gasoline with a detergent additive. Generally, new automobiles need high octane gasoline **only** if the manufacturer recommends it.
- Always follow the auto manufacturer's octane recommendations in your owner's manual.

Octane Myths

- ***High octane gasoline improves mileage.***
In general, if your car is designed to run on 87 octane gasoline, high octane gasoline will not improve mileage. If switching to high octane gasoline does improve mileage, you might find that your engine, or its control systems, need repair.
- ***High octane gasoline gives quicker starting.***
No, it doesn't.
- ***High octane gasoline increases power.***
If your car is designed to run on 87 octane gasoline, you shouldn't notice any more power on high octane gasoline. Again, if it does make a noticeable difference, your engine, or the engine's electronic control systems, may need repair.
- ***High octane gasoline has been refined more – it is just a better product.***
Additional refining steps are used to increase the octane; however, these additional steps do not necessarily make the gasoline a "better" product for all engines. They just yield a different blend of hydrocarbons that burn more slowly. The additional steps also increase the price.

The Minnesota Department of Commerce, Weights and Measures Division regularly checks the quality, safety and labeling of motor fuels, heating fuels and gasoline sold in Minnesota.

The Division also ensures the accuracy of all commercial transactions in the state involving products that are weighed or measured. These products include grain, produce, livestock and gasoline.

For more information on these services, contact the Minnesota Department of Commerce, Weights and Measures Division, 2277 Highway 36, St. Paul, MN 55113-3800, Phone: 651-215-5821.